the storm area expanding and contracting from day to day. On the 24th a second LOW was central near latitude 53°, longitude 47°, and the two storm areas practically met in mid-ocean.

Dutch S. S. *Newyork:*

Gale began on the 22d, wind W. Lowest barometer 29.54 inches at 6 p. m. on the 23d, wind W., in latitude 50° N., longitude 20° 13′ W. End on the 24th, wind W. Highest force of wind 8; shifts S.-SW.-W.

British S. S. *Parthenia:*

Gale began on the 24th, wind WSW. Lowest barometer 29.20 inches at 10:30 a. m. on the 24th, wind W., 10, in latitude 52° 27′ N., longitude 47° 58′ W. End on the 25th, wind NNW. Highest force of wind 11; shifts WSW.-NW.-NNW.

British S. S. *Samaria:*

Gale began on the 24th, wind S. Lowest barometer 28.97 inches on the 24th, wind W., 10, in latitude 51° 05′ N., longitude 17° 11′ W. End on the 25th, wind W. Highest force of wind 10; shifts WSW.-W.

Charts VIII to XII show the daily conditions prevailing from the 26th to the 30th, inclusive. It was during this period that the tropical disturbance, previously referred to, prevailed. A report of this hurricane will be found elsewhere in the REVIEW, but several gale reports from vessels involved are given herewith:

American S. S. *Hera:*

Gale began on the 26th, wind SSE. Lowest barometer 29.34 inches at 10 a. m. on the 26th, wind SSE., 5, in latitude 28° 30′ N., longitude 71° 45′ W. End on the 27th, wind S. Highest force of wind 10, SSW.; shifts SSE.-S.

American S. S. *Currier:*

Gale began on the 26th, wind ENE., 7. Lowest barometer 29.56 inches at 9 a. m. on the 27th, wind NE., in latitude 29° 35′ N., longitude 76° 50′ W. End at 4 p. m. on the 27th, wind NNW. Highest force of wind 10, ENE.; shifts NE. by E.-NE.

British S. S. *Eastern Prince:*

Gale began on the 27th, wind ESE. Lowest barometer 29.46 inches at noon on the 29th, wind N., 10, in latitude 32° 39′ N., longitude 75° 16′ W. End on the 30th, wind SW. Highest force of wind 10, N.; shifts NNE.-N.-NNW.

American S. S. *Afel:*

Gale began on the 28th, wind SSE. Lowest barometer 29.58 inches at 4 p. m. on the 29th, wind SW., in latitude 27° 34′ N., longitude 73° 10′ W. End at 8 a. m. on the 30th, wind NW. Highest force of wind 10; shifts SW.-NW.

British S. S. *Maraval:*

Gale began on the 29th, wind ESE. Lowest barometer 28.98 inches on the 30th, wind ESE., in latitude 34° 49′ N., longitude 70° 39′ W. End on the 30th, wind NW. Highest force of wind 12, NE.; shift 10 points.

NORTH PACIFIC OCEAN.

By WILLIS E. HURD.

Over a substantial area of the North Pacific Ocean there was no material change in September from the good weather of the preceding month. Over the most frequented northern routes, however, the advent of autumn was manifested in the increased activity of the Aleutian LOW, which resulted in squalls and storm winds of much greater frequency and severity than in August.

For the month as a whole pressure averaged below normal over the eastern part of the ocean, the greatest relative departure occurring at Midway Island. Here the pressure for the month, based on p. m. observations, was 29.93 inches, as compared with the normal of 30.01, or a deficiency of 0.08 inch. The average departure from normal at Midway Island in the month of September for the past 12 years has been 0.04 inch. The highest pressure, 30.08, occurred on the 3d and 31st; the lowest, 29.94, on the 17th. The average pressure at Dutch Harbor, based upon p. m. observations, was 29.68 inches. The normal here for September is 29.75. The highest pressure, 30.54, occurred on the 17th; the lowest 28.54, on the 27th. Absolute range, 2 inches. There were five days in which a. m. or p. m. pressures were below 29 inches. It will be noted that the range in pressure between Midway Island and Dutch Harbor on the p. m. of the 17th was 1.34 inches. At Honolulu the average p. m. pressure was 29.97, or 0.01 below normal. The highest pressure, 30.18, occurred on the 18th; the lowest, 29.82, on the 20th.

About the 18th of the month the northern portion of Bering Sea was swept by severe gales, and several schooners bound for Nome were reported greatly in danger. The p. m. observation at Nome on the 18th showed a pressure of 29.76 inches and a south wind, force 7. Pressure there continued low for several subsequent days.

Along the routes between the Hawaiian Islands and the American mainland the weather was generally good. The North Pacific high-pressure area maintained a fair-to-good development throughout most of the month. Its center for many days was near 45° north latitude, 150° west longitude, thus giving prevailing winds from the east at Honolulu.

On the 16th pressure began falling at Midway Island, and reached its minimum there on the 17th. The p. m. observation of the 17th showed the wind to be of force 6 from the west, pressure 29.24. During these dates a storm was in the vicinity, but it was reported by only one vessel, the American S. S. *Dickenson*, Capt. George Peltz, Midway toward Honolulu. On the 17th this steamer recorded a south wind, force 4, pressure 29.64, in latitude 26° 40′ N., longitude 173° 20′ W.; and on the 18th a south by west wind, force 8, pressure 29.81 inches, in 26° 10′ N., 170° 20′ W. The storm apparently moved northward from Midway, although the subsequent drop in pressure at Honolulu on the 20th might be taken as an indication that the cyclone had spread eastward, diminishing in intensity and vanishing in low latitudes. At Honolulu on the 21st the remarkable phenomenon of thunder was heard in consequence of the unsettled conditions. This is the fourth time in which thunder has been heard in September at this station since its establishment in 1904.

Conditions were generally quiet along the tropical west coast of North America. Vessel reports thus far received indicate no disturbance at sea in the vicinity. A newspaper report, however, tells of a storm which damaged Acapulco, Mexico, on the 23d. There is no indication of this on the weather map.

In the Far East at least two tropical cyclones of great intensity occurred in September. Lack of complete information from the Philippine Islands and of the regular daily observations from Japan, both of which contribute greatly to our knowledge of conditions in this quarter, render it impossible at this writing to announce more than this number, or further regarding the movements of these storms.

During the earthquake which so vitally damaged certain sections of Japan on September 1, it was reported that the horrors of the catastrophe at Yokohama were intensified by the presence of a typhoon. It is true that the remnants of a tropical storm, which had been hovering over the southern portion of the archipelago for two or three days, were still existent. Heavy rain occurred at Yokohama during the early morning, and the winds were moderate to fresh southerly during most of the day,

with the center of the depression slightly to the westward. This brisk south wind undoubtedly fanned considerably the flames of the burning city. The observer on board the British S. S. *Philoctetes* reported in the afternoon that "small local whirlwinds circulating clockwise were created in some parts of the harbor. The water as it followed these whirls was extremely agitated."

During the late hours of the 8th and the early hours of the 9th the Japanese S. S. *Ypres Maru*, Captain Kimura, Observer Yashida, Kobe toward Portland, experienced a typhoon in latitude 39° 30′ N., longitude 147° E. At 1 a. m. of the 9th a hurricane wind from the west was experienced, lowest pressure 28.12 inches (uncorrected).

During the 9th the American S. S. *President McKinley*, Captain Justie, Seattle toward Yokohama, encountered the full blast of this typhoon in latitude 43° 45′ N., longitude 154° 20′ E. Gale winds lasted from 9 a. m. to about 4 p. m., highest force 12, from the SSW., shifting to W., lowest pressure 29.06 inches.

During the period from the 9th to the 15th the American tank S. S. *Broad Arrow*, Capt. J. A. Vanden Heuvel, Observer A. G. Popkin, Hongkong toward San Pedro, was involved either in two typhoons, or, what is perhaps more probable, the same typhoon at different times. To quote:

September 9: At 6 p. m. wind increased to force 7. NNW. Position at 8:08 p. m., latitude 26° 17′ N., longitude 122° E. Wind at midnight had increased to force 8.

September 10: At 1 a. m. wind shifted to NW. by N. 8; at 2:15 a. m. to NW., increasing to force 9 at noon, barometer 29.61; 2:15 p. m. wind increased to force 10, barometer 29.54; 8:15 p. m. position, 26° 50′ N., 123° 20′ E.; 11 p. m. wind increased to force 12, and shifted to W. by N., running into typhoon, barometer 29.16.

September 11: At 1:35 a. m. entered central area of typhoon, wind shifting to SW., force 4, barometer 29.03. At 3 a. m., in 27° 20′ N., 123° 50′ E., passed through center of typhoon—perfectly calm—ship literally covered with bugs and small birds. Barometer 28.92. Remained calm until 5:30 a. m. when wind came from east with force of 10. At 10 a. m. barometer began rising and wind moderating, shifting to E. by N., force 8. At 4 p. m. wind E., force 6, barometer 29.72. *Position at 8:20 p. m.*, 28° 30′ N., 124° 45′ E.

September 13: At 4 p. m. barometer 29.59. wind ENE. 9. Strong gale and increasing to NE. by E., force 10, barometer 29.50 at midnight. Position at 8:48 p. m., 31° 09′ N., 131° 36′ E.

September 14: At 8 a. m. barometer 29.31. Wind NE., blowing typhoon, and lasting until 1 a. m., September 15. Lowest pressure 28.92 inches in latitude 32° 40′ N., longitude 134° 30′ E. Highest wind force NW. 12.

The Dutch S. S. *Arakan*, Capt. J. Hamersma, Observer P. Bubberman, made interesting observations of this storm. The *Arakan* left Nagasaki for Kobe, via Moji, at 5 a. m. of the 12th. Her subsequent experiences are quoted:

Departing from Moji, we saw a typhoon warning hoisted, the typhoon being south of Japan and moving in NNW. direction. After leaving, the barometer fell quickly, while the wind changed from ENE. to NNE., later veering to ENE., increasing to force 9 in the evening of the 14th. During the night of the 13th–14th the barometer kept on falling quickly, wind ENE.–NE., 4 to 5. In the morning of the 14th it began gaining, first a little, then strong. So in the afternoon of the 14th at 4 p. m. we were forced to anchor south of Shodo-Shima, in Sakate Bay, as we could not see anything. Toward midnight the wind decreased a little, but the rain fell down in torrents. The barometer kept on falling, and this in connection with the steady direction of the wind (NNE.), caused us to believe that the center would pass either overhead or very near. At 11 p. m. the wind decreased very suddenly, and the sky cleared overhead, so that we could see the stars shining. * * * The next morning it cleared so far that we could proceed to Kobe, where we anchored at 4 p. m. of the 15th. At 3 p. m. our barometer reached its lowest point, 735.3 mm. (28.95 inches), then began rising quickly.

On September 14 the American tank S. S. *Liebre*, Captain Christensen, Tokuyama, Japan, toward San Pedro, Calif., experienced the storm in approximately latitude 36° 16′ N., longitude 137° E., wind ESE., force 11, pressure 29.28 inches.

This typhoon is reported to have been particularly disastrous to a portion of Japan northwest of Kobe. The rains were extraordinarily heavy, and several small villages were destroyed by floods. Tokio and Yokohama also suffered greatly. Some 5,000 people are said to have lost their lives by drowning on the 13th and 14th.

On the 23d and 24th of the month a disturbance which may have been a typhoon was reported by the American S. S. *West Momentum*, Captain Wennerlund, Nogoya, Japan, toward Portland, Oreg. The first gale was experienced at 10 p. m. of the 23d, wind NNE., force 8. The lowest pressure was 28.92 inches (uncorrected), near 34° 27′ N., 138° 40′ E., on the 24th, highest force of the wind N., 10. Associated with this storm were the gales of forces 7 and 8 encountered by the Japanese S. S. *Tokiwa Maru* from the 22d to the 25th while eastward bound between 36° 30′ N., 142° 40′ E., and 42° 45′ N., 156° 10′ E.

To the eastward of the 180th meridian, as generally observed along the northern steamship routes, the stormy weather which has been previously alluded to did not set in with vigor until after the 20th, although occasional gales occurred of force not exceeding 8, especially near 50° N., 150° W., on the 9th and 10th. On the 21st, however, the cyclone, which had been central for several days in the vicinity of Nome, began traveling inland and southward, and by the 23d was causing rough weather over the Gulf of Alaska and thence along the coast to Vancouver. On this date, in the extreme northern edge of the gulf—59° 52′ N., 149° 28′ W.—the American S. S. *Northwestern* experienced north-northwesterly to north-northeasterly gales rising to force 10, lowest pressure 29.54. In 49° N., 137° 55′ W., the Japanese S. S. *Hakata Maru* experienced a northwesterly gale, force 8, minimum pressure 29.50 inches. In 48° 48′ N., 127° 14′ W., the American S. S. *Crosskeys* reported a southeast gale, force 8, pressure 29.75 inches.

On the 25th this storm had dissipated, but another, central over Alaska, was stirring the waters of the northern gulf and the Aleutian region. The *Northwestern* encountered a southeasterly gale, force 11, pressure 29.18 inches, in 59° N., 142° W. The observer stated:

While in a southeasterly gale off Cape St. Elias, a vessel in latitude 58° 50′ N., longitude 140° W., at 8 p. m. reported: "Weather clear and calm. Clouds coming up from the southeast." Whole gale until a. m. 26th off Cape Spencer, with continuous heavy rain.

From the 26th until the close of the month the primary storm center was over the Aleutians and southwestern Alaska and was causing gales and heavy seas over a large expanse of ocean. The British S. S. *Achilles* reported gales from the 25th when in 49° 57′ N., 172° 08′ W., until late on the 29th, when near 49° 22′ N., 133° W. Her highest recorded wind was SW., 10, on the 27th, lowest pressure 28.85 inches on the 28th. This low reading occurred in 50° 01′ N., 149° 44′ W. The Japanese S. S. *Shidzuoka Maru*, bound for Seattle, experienced gales from the 26th until the 30th over much the same area as in the preceding instance. The highest wind force was 10 from the SSE., lowest pressure 28.76 inches, in 51° 02′ N., 157° 40′ W., on the 28th. Other vessels, all eastward bound, reporting high winds during this period were the Dutch S. S. *Arakan*, with highest wind force 9, SSW., lowest pressure 733 mm. (28.86 inches) uncorrected, in 49° 45′ N., 155° 46′ W., on the 28th; the American S. S. *Broad Arrow*, SW., 9, lowest pressure 29.57 inches, in 42° 19′ N., 155° 05′ W., on the 28th;

the American S. S. *West Keats*, NW., 10, lowest pressure 29.02 inches, in 49° 50′ N., 166° W., on the 28th; and the British S. S. *Tahchee*, SSW., 9, lowest pressure 29.54 inches, in 45° 22′ N., 146° 20′ W. On the 30th the rough weather of the previous week showed signs of abatement.

Fog conditions, as drawn from ships' observations, indicate some slight clearing up since August. Scattered fog, however, occurred all along the northern routes, being particularly frequent to the westward of the 180th meridian. Between the 35th and 40th parallels, off the California coast, fog was reported on 9 days.

NOTE.

The American S. S. *Algonquin*, Capt. W. S. Harriman, Observer J. L. Patton, reports: "September 2, 8:30 p. m., latitude 14° 27′ N., longitude 95° 57′ W. A number of waterspouts to southward."

GALES ON THE SOUTH PACIFIC OCEAN.

By WILLIS E. HURD.

On the 7th and 8th of September, 1923, the British S. S. *Doonholm*, Capt. W. R. S. Branigan, experienced a southwest gale, force 7, lowest pressure 29.47 inches, in latitudes 43° 29′ S., to 42° S., longitudes 155° 20′ E. to 151° E., while on a voyage from Dunedin, New Zealand, toward Melbourne.

On the 8th and 9th of the month the British S. S. *Niagara*, Capt. J. T. Rolls, Sydney toward Auckland, experienced heavy squalls for several hours, near latitude 34° 50′ S., between longitudes 168° and 175° E. The highest force of the wind was 10 from the NE., on the 9th, lowest pressure 29.57 inches.

The British S. S. *Doonholm* again encountered a northwest to southwest storm in latitude 38° S., longitude 145° E., on the 20th. The highest wind force was SW. 10, lowest pressure 29.06.

EIGHT TYPHOONS IN THE FAR EAST DURING AUGUST, 1923.

By Rev. José CORONAS, S. J.

[Weather Bureau, Manila, P. I.]

There were no less than eight typhoons shown by our weather maps in the Far East during the month of August. Although only two of them traversed the Philippine Islands, yet several others influenced us a great deal in our weather, particularly with heavy rains and floods in the western part of Luzon. The monthly total rainfall for Manila and a few other stations of western Luzon, with the respective difference from the normal of August, will be of interest to our readers.

Stations.	Monthly total.	Difference from normal.
	mm.	*mm.*
Manila	1,147.6	+737.3
Iba	2,401.2	+1,326.8
Dagupan	1,189.3	+636.8
Baguio	2,378.7	+1,133.6
San Fernando Union	1,437.2	+705.1
Vigan	1,151.7	+432.8

The heaviest rains for 24 hours were those of Baguio, 533.4 mm.; San Fernando Union, 394.7 mm., and Iba, 288.7 mm. The heaviest daily rainfall for Manila was 197.4 mm.

The Babuyanes typhoon, August 3.—This typhoon was probably formed on July 29 to 30 to the east of southern Luzon, not far from 128° longitude E. and 13° or 14° latitude N. Its track was somewhat indefinite until 6 a. m. of August 2, when we could situate the center quite approximately in 125° longitude E., between 17° and 18° latitude N. Hence, it moved WNW., passing through the Babuyanes Islands about 40 miles to the north of Aparri in the afternoon of the 3d and entering China to the NE. of Hongkong in the afternoon of the 5th. The approxiate position of the center at 6 a. m. for the period August 3 to 5 was as follows:

August 3, 6 a. m., 122° 35′ longitude E.; 18° 50° latitude N.

August 4, 6 a. m., 118° 45′ longitude E.; 20° 30′ latitude N.

August 5, 6 a. m., 116° 00′ longitude E.; 22° 15′ latitude N.

The Loochoos and China typhoon, August 3 to 8.—This typhoon was first noticed in our weather maps in the afternoon of the 3d in about 138° longitude E. and 23° latitude N. It moved WNW. toward the Loochoos, the barometer at Naha having fallen at 6 p. m. of the 6th to about 722 mm. Between the Loochoos and China the typhoon inclined westward. The approximate position of the center at 6 a. m. of the 6th to 8th was:

August 6, 6 a. m., 129° 40′ longitude E.; 25° 30′ latitude N.

August 7, 6 a. m., 125° 00′ longitude E.; 27° 20′ latitude N.

August 8, 6 a. m., 119° 15′ longtitude E.; 26° 55′ latitude N.

The Meiacosima and China typhoon, August 8 to 11.—The first part of the track of this typhoon is somewhat uncertain, although it probably formed on August 3 to 4 south of Guam near 145° longitude E. and 10° latitude N., moving northwestward until August 6 and then westward on the 7th and part of the 8th. The center can easily be situated in our weather map of the 8th, 6 a. m., near 130° longitude E., between 18° and 19° latitude N.; and at 6 a. m. of the 9th in about 127° longitude E., between 20° and 21° latitude N. The typhoon was moving then NNW. and so it struck the Meiacosima group of islands about 150 miles east of northern Formosa on the 10th. The station of Ishigakihima reported at 6 a. m. of that day a barometer as low as 722.5 mm. with hurricane winds from the N. From Meiacosima the typhoon inclined northwestward and entered China in the morning of the 11th between 27° and 28° latitude N. Once in China it moved again NNW., gradually recurving to the NE. on the 12th, and traversed Manchuria on the 13th.

The Batanes and Hongkong typhoon, August 17 and 18.—The first part of this typhoon is somewhat uncertain and indefinite, although we are inclined to believe that it is the same as was shown in our weather map at 2 p. m. of the 11th to the SSW. of Guam in about 143° longitude E. and 11° latitude N. If this be the case, we have to suppose that after moving NNW. from the 11th to the 13th, it inclined decidedly to the W. on the 13th and 14th. The center was clearly situated at 6 a. m. of the 16th, between 20° and 21° latitude N. and in about 127° longitude E. It was moving almost due W.